

100BASE-TX/100BASE-FX Multi-Port Media Converter

E-TX-FX-1200, E-TEL-1200, E-TX-FX-0600

USER'S GUIDE

COMPLIANCE INFORMATION

UL Listed
C-UL Listed (Canada)
CISPR/EN55022 Class A

FCC Regulations

This equipment has been tested and found to comply with the limits for a class A digital device, pursuant to part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at the user's own expense.

Canadian Regulations

This digital apparatus does not exceed the Class A limits for radio noise for digital apparatus set out on the radio interference regulations of the Canadian Department of Communications.

Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de la class A prescrites dans le Règlement sur le brouillage radioélectrique édicté par le ministère des Communications du Canada.

European Regulations

Warning

This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

Achtung !

Dieses ist ein Gerät der Funkstörgrenzwertklasse A. In Wohnbereichen können bei Betrieb dieses Gerätes Rundfunkstörungen auftreten, in weichen Fällen der Benutzer für entsprechende Gegenmaßnahmen verantwortlich ist.

Attention !

Ceci est un produit de Classe A. Dans un environnement domestique, ce produit risque de créer des interférences radioélectriques, il appartiendra alors à l'utilisateur de prendre les mesures spécifiques appropriées



CAUTION: RJ connectors are NOT INTENDED FOR CONNECTION TO THE PUBLIC TELEPHONE NETWORK. Failure to observe this caution could result in damage to the public telephone network.

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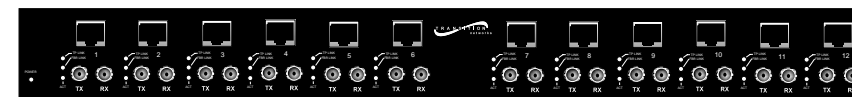
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E-TX-FX-1200 (shown) Provides twelve (12) independent media converter connections between Fast Ethernet™ over twisted-pair copper (twelve RJ-45 connectors) and Fast Ethernet™ over singlemode or multimode fiber (twelve fiber connectors, selected as a set according to network requirements).

E-TEL-1200 (not shown) Provides twelve (12) independent media converter connections between Fast Ethernet™ over twisted-pair copper (one 50-pin Telco connector) and Fast Ethernet™ over singlemode or multimode fiber (twelve fiber connectors, selected as a set according to network requirements).

E-TX-FX-0600 (not shown) Provides six (6) independent media converter connections between Fast Ethernet™ over twisted-pair copper (six RJ-45 connectors) and Fast Ethernet™ over singlemode or multimode fiber (six fiber connectors, selected as a set according to network requirements).

Fiber Cable/Connector Options* by Model:

E-TX-FX-xx00/E-TEL-1200: **multimode** fiber, **ST** connectors

E-TX-FX-xx00(SC)/E-TEL-1200(SC): **multimode** fiber, **SC** connectors

E-TX-FX-xx00(MT)/E-TEL-1200(MT): **multimode** fiber, **MT-RJ** connectors

E-TX-FX-xx00(SM)/E-TEL-1200(SM): **singlemode** fiber, **SC** connectors

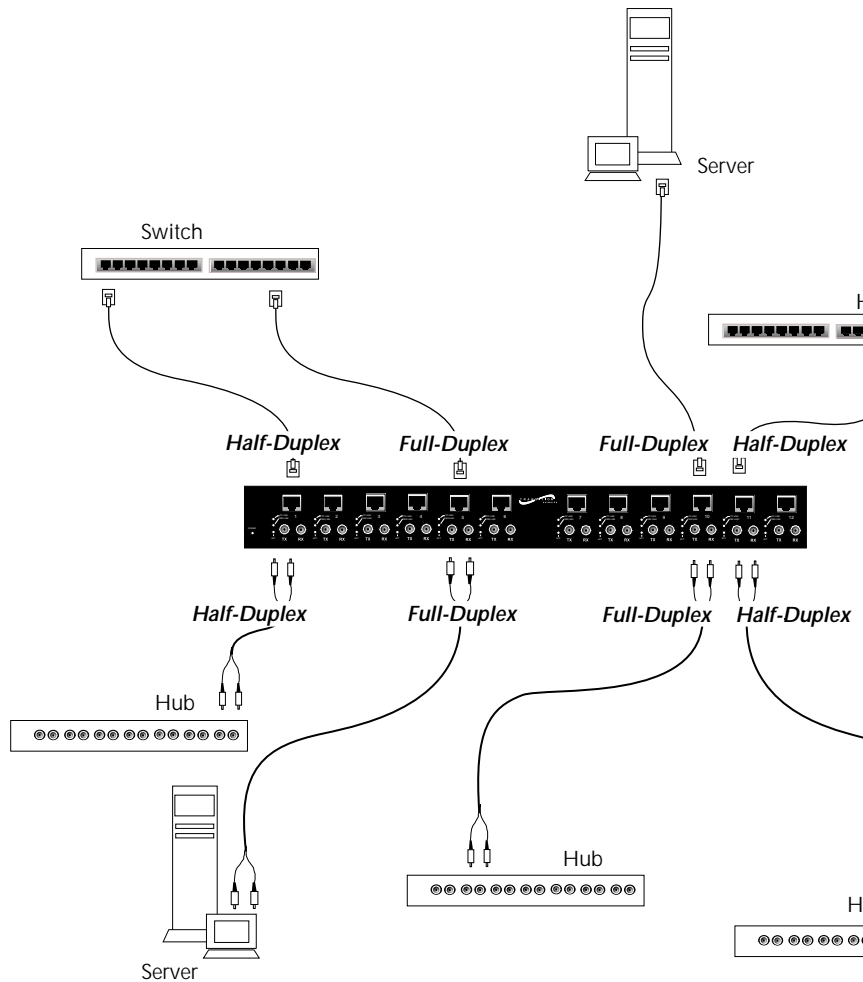
E-TX-FX-xx00(LH)/E-TEL-1200(LH): **singlemode** fiber, **SC** connectors

*See page 9 for detailed specifications.

*The LinkAlert™ feature allows each media converter port to pass link faults between connected 100BASE-TX and 100BASE-FX devices.

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E-TX-FX-XX00 IN THE NETWORK

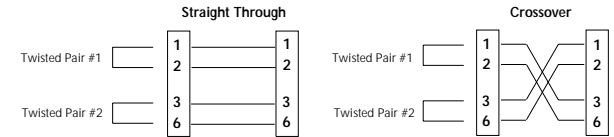


Each media converter port in the multi-port media converter operates independently over one isolated twisted-pair copper/fiber-optic cable link. The media converter port receives and transmits network signals in either full-duplex or half-duplex, depending upon the network devices to which the media converter port is attached.

NOTE: In Telco option (not shown), the 50-pin Telco connector concentrates up to 12 UTP connections onto one connector. This concentration of UTP ports is then broken out for connection to fiber.

RJ-45 CONNECTOR

Twisted pair connection requires two active pairs configured as straight through and/or crossover. The two active pairs in an Ethernet™ network are pins 1 & 2 and pins 3 & 6. Use only dedicated wire pairs (such as blue/white & white/blue, orange/white & white/orange) for the active pins.



NOTE: The multi-port media converter **AutoCross™** feature allows either straight-through or crossover twisted-pair copper cable to be used when connecting to 10BASE-T devices. AutoCross™ determines the characteristics of cable connections to the media converter port and then automatically configures the port to link up.

TECHNICAL SPECIFICATIONS

Standards	IEEE 802.3 1998 Edition	
Case Dimensions	19.0" x 8.5" x 1.5"	(483 mm x 216 mm x 38 mm)
Environment	Temperature:	0-50°C (32° to 122° F)
	Humidity	10-95%, non condensing
	Altitude	0-10,000 feet
Power	100-240 VAC, 50/60 Hz., 1 Amp (maximum)	
Warranty	Lifetime	

TRANSITION NETWORKS

DECLARATION OF CONFORMITY

Name of Mfg: **Transition Networks**
6475 City West Parkway, Minneapolis MN 55344 USA

Model: **E-TX-FX-xx00, E-TEL-xx00 Series Multi-Port Media Converter**

Part Number(s): **E-TX-FX-0600, E-TX-FX-0600(SC), E-TX-FX-0600(SM), E-TX-FX-0600(LH), E-TX-FX-0600(MT), E-TX-FX-1200, E-TX-FX-1200(SC), E-TX-FX-1200(SM), E-TX-FX-1200(LH), E-TX-FX-1200(MT), E-TEL-1200, E-TEL-1200(SC), E-TEL1200(SM), E-TEL-1200(LH), E-TEL-1200(MT)**

Regulation: **EMC Directive 89/336/EEC**

Purpose: To declare that the **E-TX-FX-0600, E-TX-FX-1200** or **E-TEL-1200** to which this declaration refers is in conformity with the following standards.
EMC-CISPR 22: 1985 Class A; EN 55022: 1988 Class A; EN 50082-1:1992; EN 60950 A4:1997; IEC 801.2, IEC 801.3, and IEC 801.4; IEC 950

I, the undersigned, hereby declare that the equipment specified above conforms to the above Directive(s) and Standard(s).

Stephen Anderson
Stephen Anderson, Vice-President of Engineering

September 3, 1999
Date

CABLE SPECIFICATIONS (continued)

COPPER CABLE

Each RJ-45 connector requires 2 pairs of Category 5 rated cable.

The 50-pin Telco connector requires 24 pairs of Category 5 rated cable.

Either shielded twisted-pair (STP) or unshielded twisted-pair (UTP) can be used. DO NOT USE FLAT OR SILVER SATIN WIRE.

CATEGORY 5:

Gauge	24 to 22 AWG
Attenuation	22.0 dB /100m @ 100 MHz
Maximum Cable Distance:	Telco 75 meters
	RJ-45 100 meters

TELCO CONNECTOR



TELCO SIGNALS

Pin #	Signal	Pin #	Signal
1	Port 1 Transmit -	26	Port 1 Transmit +
2	Port 1 Receive -	27	Port 1 Receive +
3	Port 2 Transmit -	28	Port 2 Transmit +
4	Port 2 Receive -	29	Port 2 Receive +
5	Port 3 Transmit -	30	Port 3 Transmit +
6	Port 3 Receive -	31	Port 3 Receive +
7	Port 4 Transmit -	32	Port 4 Transmit +
8	Port 4 Receive -	33	Port 4 Receive +
9	Port 5 Transmit -	34	Port 5 Transmit +
10	Port 5 Receive -	35	Port 5 Receive +
11	Port 6 Transmit -	36	Port 6 Transmit +
12	Port 6 Receive -	37	Port 6 Receive +
13	Port 7 Transmit -	38	Port 7 Transmit +
14	Port 7 Receive -	39	Port 7 Receive +
15	Port 8 Transmit -	40	Port 8 Transmit +
16	Port 8 Receive -	41	Port 8 Receive +
17	Port 9 Transmit -	42	Port 9 Transmit +
18	Port 9 Receive -	43	Port 9 Receive +
19	Port 10 Transmit -	44	Port 10 Transmit +
20	Port 10 Receive -	45	Port 10 Receive +
21	Port 11 Transmit -	46	Port 11 Transmit +
22	Port 11 Receive -	47	Port 11 Receive +
23	Port 12 Transmit -	48	Port 12 Transmit +
24	Port 12 Receive -	49	Port 12 Receive +
25	N.C.	50	N.C.

Media Converter Port in Full-Duplex Network

In a full-duplex network, maximum cable lengths are determined by the cables used. See page 10 for cable specifications.

NOTE: The 512-Bit Rule described below does NOT apply in a full-duplex network.

Media Converter Port in Half-Duplex Network

The 512-Bit Rule applies separately to each collision domain.

USING THE 512-BIT RULE

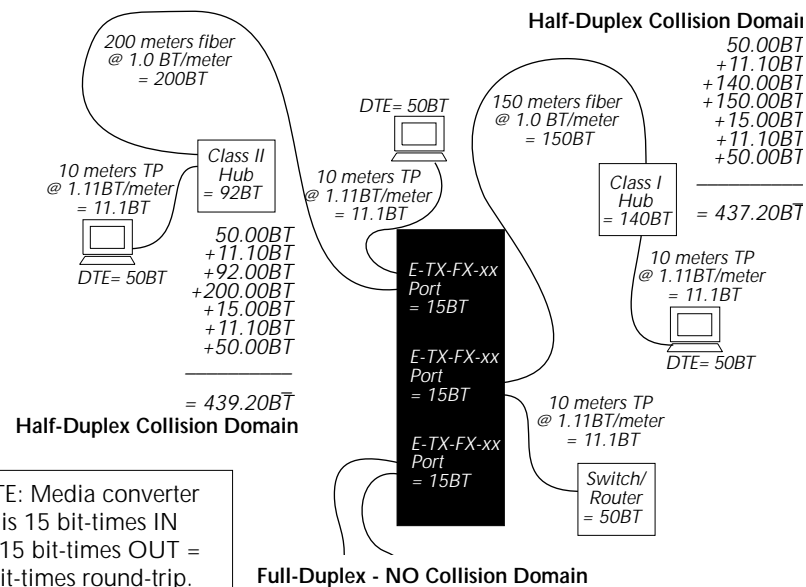
In a half-duplex network, maximum cable lengths are determined by the round trip delay limitations of each Fast Ethernet™ collision domain. (Switches and routers divide the network into separate Ethernet™ collision domains.) The 512-Bit Rule determines maximum distances by calculating the collision domain round-trip delay in bit-times.

To calculate a collision domain round-trip delay in bit-times, find the

Class I repeater	140 BT
Class II repeater	92 BT
Class I TX/FX media converter	130 BT
Class II TX/FX media converter	92 BT
DTE (PC, switch, router)	50 BT
E-TX-FX-xx port	15 BT
1 meter CAT.5 TP cable	1.11 BT
1 meter fiber cable	1 BT
Fast Ethernet switch	50 BT

longest path between any two terminal devices in the collision domain. Calculate the round trip delay by multiplying the length of the cable (in meters) by the delay per meter (in bit-times (BT)), then take the sum of all cable delays plus station (DTE), repeater, and multi-port media converter port delays. If

the result is less than or equal to 512 bit-times, the path is good.



NOTE: Media converter port is 15 bit-times IN and 15 bit-times OUT = 30 bit-times round-trip.

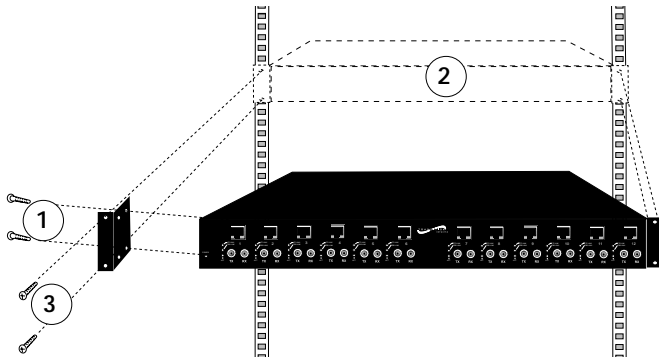
INSTALLATION

Install E-TX-FX-xx00 at Site

WARNING: During the site installation, handle the E-TX-FX-xx00 in such a way that the E-TX-FX-xx00 does not fall. Failure to observe this warning could result in injury to personnel and/or equipment damage.

To install the E-TX-FX-xx00 in 19-inch rack cabinet:

NOTE: Brackets and screws are provided.

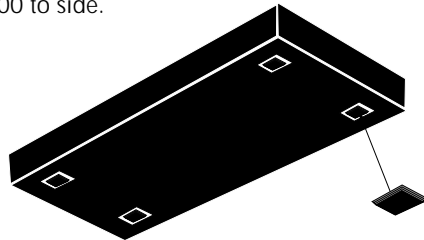


1. Install right and left mounting brackets to E-TX-FX-xx00 chassis by removing two (2) screws from each side of E-TX-FX-xx00 chassis and then installing those screws through mounting bracket into E-TX-FX-xx00 chassis.
2. Carefully align the E-TX-FX-xx00 between rack mounting rails.
3. Install E-TX-FX-xx00 in rack by installing two (2) screws through right front bracket into rack and two (2) screws through left front bracket into rack, using clip nuts (NOT provided) if necessary.

To install the E-TX-FX-xx00 on table or other flat surface:

NOTE: Rubber feet are provided.

1. Carefully turn E-TX-FX-xx00 to side.
2. Install four (4) rubber feet:
 - Separate rubber feet.
 - Remove protective paper from adhesive surface on rubber foot.
 - Position and secure each rubber foot as shown.
3. Return E-TX-FX-xx00 to upright position.



CABLE SPECIFICATIONS

The physical characteristics of the media cable must meet or exceed IEEE 802.3 specifications, 1998 Edition.

Fiber Cable

MULTIMODE

Fiber Optic Cable Recommended:	62.5 / 125 μ m multimode fiber
Optional:	100 / 140 μ m multimode fiber 85 / 125 μ m multimode fiber 50 / 125 μ m multimode fiber
Bit error rate:	$\leq 10^{-11}$
E-TX-FX-xx00, E-TEL-1200	1300 nM
Fiber-optic Transmitter Power:	min: -19.0 dBm max: -14.0 dBm
Fiber-optic Receiver Sensitivity:	min: -30.0 dBm max: -14.0 dBm
Link Budget	11.0 dB
Typical Maximum Cable Distance:*	2 kilometers
E-TX-FX-xx00(SC), E-TEL-1200(SC)	1300 nM
Fiber-optic Transmitter Power:	min: -19.0 dBm max: -14.0 dBm
Fiber-optic Receiver Sensitivity:	min: -30.0 dBm max: -14.0 dBm
Link Budget	11.0 dB
Typical Maximum Cable Distance:*	2 kilometers
E-TX-FX-xx00(MT), E-TEL-1200(MT)	1300 nM
Fiber-optic Transmitter Power:	min: -19.0 dBm max: -14.0 dBm
Fiber-optic Receiver Sensitivity:	min: -33.5 dBm max: -14.0 dBm
Link Budget	14.5 dB
Typical Maximum Cable Distance:*	2 kilometers

SINGLEMODE

Fiber Optic Cable Recommended:	9 μ m singlemode fiber
Bit error rate:	$\leq 10^{-11}$
E-TX-FX-xx00(SM), E-TEL-1200(SM)	1300 nM
Fiber-optic Transmitter Power:	min: -15.0 dBm max: -8.0 dBm
Fiber-optic Receiver Sensitivity:	min: -31.0 dBm max: -8.0 dBm
Link Budget	16.0 dB
Typical Maximum Cable Distance:*	20 kilometers
E-TX-FX-xx00(LH)**, E-TEL-1200(LH)**	1300 nM
Fiber-optic Transmitter Power:	min: -8.0 dBm max: -2.0 dBm
Fiber-optic Receiver Sensitivity:	min: -34.0 dBm max: -7.0 dBm
Link Budget	26.0 dB
Typical Maximum Cable Distance:*	40 kilometers

*Actual distance dependent upon physical characteristics of network installation.

**Requires a minimum loss of 5 dB over cable or damage to receiver may occur.

FAULT ISOLATION and CORRECTION

If the multi-port media converter fails, isolate and correct the fault by determining the answers to the following questions and then taking the indicated action:

1. **Is the *POWER LED* on the multi-port media converter illuminated?**

NO

- Is the power cord properly installed in the media converter and in the grounded AC outlet?
- Does the grounded AC outlet provide power?
- Contact Technical Support: (800) 260-1312/(800) 526-9267.

YES

- Proceed to step 2.

2. **Are any of the 100BASE-TX *TX LINK* LEDs illuminated?**

YES

- Check twisted pair cables for proper connection.
- Contact Technical Support: (800) 260-1312/(800) 526-9267.

NO

- Proceed to step 3.

3. **Are any of the 100BASE-FX *FBR LINK* LEDs illuminated?**

YES

- Check fiber cables for proper connection.
- Verify that TX and RX cables on media converter are connected to RX and TX ports, respectively, on other device.
- Contact Technical Support: (800) 260-1312/(800) 526-9267.

NO

- Proceed to step 4.

4. **Are any of the 100BASE-FX *ACT (Activity)* LEDs illuminated?**

NO

- Disconnect and reconnect the 100BASE-FX cable to restart the initialization process.
- Restart the workstation to restart the initialization process.
- Contact Technical Support: (800) 260-1312/(800) 526-9267.

YES

- Contact Technical Support: (800) 260-1312/(800) 526-9267.

Install Cable

NOTE: Refer to page 10 for cable and connector specifications.

COPPER

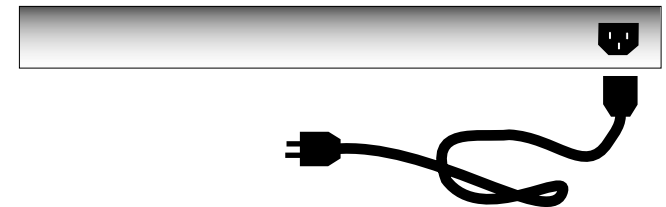
NOTE: KEEP TWISTED PAIR RUNS AS SHORT AS POSSIBLE.

1. Locate or build 100BASE-TX compliant cables with male RJ-45 plug connectors at both ends.
2. Connect male RJ-45 plug connector at one end of cable to media converter port RJ-45 jack connector.
3. Connect male RJ-45 plug connector at other end of cable to 100BASE-TX device RJ-45 jack connector.

FIBER

1. Locate or build 100BASE-FX compliant fiber cable with male two-stranded TX to RX connectors at both ends.
2. Connect male TX and RX cable connectors at one end of cable to TX and RX female connectors, respectively, on media converter port.
3. Connect male TX and RX cable connectors at other end of cable to RX and TX connectors, respectively, on 802.3 compliant fiber device.

Connect to Power

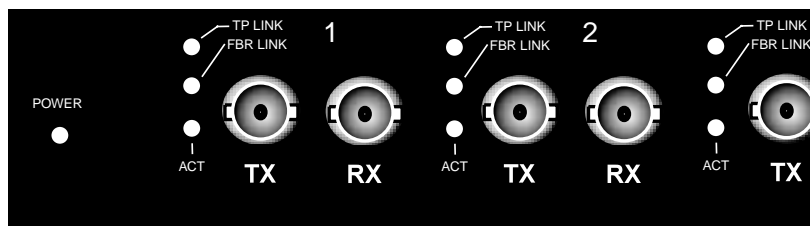


1. At multi-port media converter back, locate male power receptacle.
2. Plug female media converter end of power cord into multi-port media converter power receptacle.
3. Plug male outlet end of power cord into correct voltage, properly grounded, AC rack or wall power source.
4. Verify that multi-port media converter is powered by observing illuminated power and status LED(s).

OPERATION

Use the status LEDs to monitor multi-port media converter operation in the network.

NOTE: Each 100BASE-TX/ 100BASE-FX media converter port is identified by a number located just above the fiber connector(s) for that 100BASE-TX /100BASE-FX port connection. The LEDs that apply to each 100BASE-TX or 100BASE-FX port connector(s) are located, when facing the multi-port media converter, at the left of the connector(s) for that 100BASE-TX or 100BASE-FX port connection.

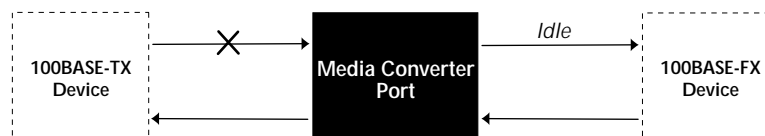


- T(WISTED) P(AIR) LINK** Steady green LED indicates good link on 100BASE-TX copper.
- F(I)B(E)R LINK** Steady green LED indicates good link on 100BASE-FX fiber.
- ACTIVITY** Flashing green LED indicates 100BASE-TX OR 100BASE-FX activity.
- POWER** Steady green LED indicates connection to external AC power.

Using LinkAlert™

The E-TX-FX-xx00 series multi-port media converter LinkAlert™ feature allows each media converter port to pass 100BASE-TX-side link faults over the port link to the 100BASE-FX side and to pass 100BASE-FX-side link faults over the port link to the 100BASE-TX side.

If the port does not detect a good link on the 100BASE-TX side, the port disables all transmission (including active-idle) on the 100BASE-FX side.



If the port does not detect a good link on the 100BASE-FX side, the port disables all transmission (including active-idle) on the 100BASE-TX side.

